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CASLER, B	
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CHRISTENSEN, O'CONNOR,
JOHNSON & KINDNESS
2800 PACIFIC FIRST CENTRE
1420 FIFTH AVE.
SEATTLE, WA 98101

DATE MAILED: 02/06/95

This is a communication from the examiner in charge of your application.
COMMISSIONER OF PATENTS AND TRADEMARKS

☒ This application has been examined ☒ Responsive to communication filed on 1-9-95 ☐ This action is made final.

A shortened statutory period for response to this action is set to expire 3 month(s), ___ days from the date of this letter.
Failure to respond within the period for response will cause the application to become abandoned. 35 U.S.C. 133

Part I THE FOLLOWING ATTACHMENT(S) ARE PART OF THIS ACTION:

1. ☐ Notice of References Cited by Examiner, PTO-892.
2. ☐ Notice of Draftsman's Patent Drawing Review, PTO-948.
3. ☐ Notice of Art Cited by Applicant, PTO-1449.
4. ☐ Notice of Informal Patent Application, PTO-152.
5. ☐ Information on How to Effect Drawing Changes, PTO-1474.
6. ☐ _____

Part II SUMMARY OF ACTION

1. ☒ Claims 89-161 are pending in the application.
   Of the above, claims _____ are withdrawn from consideration.
2. ☐ Claims _____ have been cancelled.
3. ☒ Claims 120-138 + 150-161 are allowed.
4. ☒ Claims 103-105, 106-110, 112-115, 118, 119, 139-149 are rejected.
5. ☒ Claims 93, 94, 96, 99-102, 116, + 117 are objected to.
6. ☐ Claims _____ are subject to restriction or election requirement.
7. ☐ This application has been filed with informal drawings under 37 C.F.R. 1.85 which are acceptable for examination purposes.
8. ☐ Formal drawings are required in response to this Office action.
9. ☐ The corrected or substitute drawings have been received on _____. Under 37 C.F.R. 1.84 these drawings are ☐ acceptable; ☐ not acceptable (see explanation or Notice of Draftsman's Patent Drawing Review, PTO-948).
10. ☐ The proposed additional or substitute sheet(s) of drawings, filed on _____. has (have) been ☐ approved by the examiner; ☐ disapproved by the examiner (see explanation).
11. ☐ The proposed drawing correction, filed _____, has been ☐ approved; ☐ disapproved (see explanation).
12. ☐ Acknowledgement is made of the claim for priority under 35 U.S.C. 119. The certified copy has ☐ been received ☐ not been received ☐ been filed in parent application, serial no. _____; filed on _____.
13. ☐ Since this application appears to be in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under Ex parte Quayle, 1935 C.D. 11; 453 O.G. 213.
14. ☐ Other

Part III DETAILED ACTION

Claim Rejections - 35 USC § 112

Claims 103-109 and 111-113 are rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In claims 103,106, and 108, there is no positively set forth method step to further limit the method. In claim 111, line 2, "contribution of nerve" is indefinite and a positively recited step of performing the previous steps (a)-(c) is not set forth. Claims 112 and 113 do not positively set forth a method step to further limit the method.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. § 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless --
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 89,91,103,104,108, and 119 are rejected under 35 U.S.C. § 102(b) as being clearly anticipated by Hajnal et al.

Hajnal et al. teaches everything including MR imaging of structure within the nervous system that exhibits diffusion anisotropy in order to highlight desired structures and suppress other structures within the displayed image. Hajnal et al. accomplishes this by subjecting the subject to polarizing and excitation

fields,detects a response and generates a corresponding output. The excitation fields include diffusion weighted gradients and the analysis includes outputing information representative of fascicles found in peripheral nerves.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. § 103 which forms the basis for all obviousness rejections set forth in this Office action:

> A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.
>
> Subject matter developed by another person, which qualifies as prior art only under subsection (f) or (g) of section 102 of this title, shall not preclude patentability under this section where the subject matter and the claimed invention were, at the time the invention was made, owned by the same person or subject to an obligation of assignment to the same person.

Claims 90,95,97-98,105,107,109,110,112-114, and 118 are rejected under 35 U.S.C. § 103 as being unpatentable over Hajnal et al. in view of Suzuki et al. and further in view of Bydder et al.

Hajnal et al. teaches everything as stated supra and further teaches that it is essential to properly position and immobilize the patient. Hajnal et al. does not teach suppressing the fat around the nerves with a specific intensity of the enhanced tissue or using a splint to immobilize the patient.

Suzuki et al teaches everything including an apparatus and method for obtaining brain surface images which includes a polarizing field source, an excitation source, an output arrangement, a sequence controller, and a processor, and further teaches inhibiting the signals obtained from fat on the brain surface.

Bydder et al. teaches MR imaging of anisotropically restricted diffusion of water in tumors of the central nervous system in which patient immobilization was used to reduce artifacts due to patient motion.

It is the opinion of the examiner that motion artifacts and the various means to reduce the occurrence of patient movement during imaging are well known in the art and it is further well known to suppress or enhance various structures within an image to better localize and diagnose the tissue.

It would have been obvious at the time the invention was made to one of ordinary skill in the art to include in the device of Hajnal et al. a means for suppressing the fat surrounding the nerves being imaged as taught by Suzuki et al and to use any known means to reduce patient motion as is well known in the art and taught by Bydder et al.

Claim 92 is rejected under 35 U.S.C. § 103 as being unpatentable over Hajnal et al. in view of Inoue and further in view of Dixon.

Hajnal et al. teaches everything as stated supra. Hajnal et al. does not teach subtracting image signals or adjusting for proper registration of the image.

Inoue teaches a method of separating water and fat in an image which includes calculating the difference between the two different signals.

Dixon teaches a method for imaging in which water and fat may be separated and the difference between water and fat intensity may be shown.

It would have been obvious at the time the invention was made to one of ordinary skill in the art to include in the device of Hajnal et al. a means for calculating the difference between the fat and water signals to better localize the structures of interest as taught by Inoue and Dixon.

Claim 115 and 140 is rejected under 35 U.S.C. § 103 as being unpatentable over Hajnal et al. in view of Suzuki et al and further in view of Gordon.

Hajnal et al. teaches everything as stated supra. Hajnal et al. does not teach using a contrast agent to enhance imaging or the use of phased array coils.

Gordon teaches the use of a phased array coil system, contrast agent and fat suppression techniques to enhance imaging.

It is the opinion of the examiner that the use of phased array coils in MR imaging is well known in the art. It would have been obvious at the time the invention was made to one of ordinary skill in the art to use a phased array coil system and a contrast agent in Hajnal et al. to enhance imaging as taught by Gordon.

Claims 139 and 143-149 are rejected under 35 U.S.C. § 103 as being unpatentable over Hajnal et al. in view of Suzuki et al.

Hajnal et al. teaches everything as stated supra. Hajnal et al. does not teach the specific imaging equipment to enhance nerve tissue.

Suzuki et al. teaches, as stated supra, an apparatus and method for obtaining brain surface images which includes a polarizing field source, an excitation source, an output arrangement, a sequence controller, a processor, and further teaches inhibiting the signals obtained from fat on the brain surface.

It is the opinion of the examiner that the equipment used to obtain an MR image is well known in the art. It would have been obvious at the time the invention was made to one of ordinary skill in the art to use the imaging system of Suzuki et al. in Hajnal et al. to obtain an image and suppress the desired tissues as taught by Suzuki et al.

Claims 141-143 are rejected under 35 U.S.C. § 103 as being unpatentable over Hajnal et al. in view of Suzuki et al. as stated supra and further in view of Sepponen.

Hajnal et al. teaches everything as stated supra including the need to immobilize the patient. Hajnal et al. does not teach the use of a splint to immobilize the patient or markers on the splint.

Sepponen teaches the use of markers on a frame to detect the frame position and reduce problems associated with patient movement.

It is the opinion of the examiner that various means to immobilize a patient are well known in the art. It would have been obvious at the time the invention was made to one of ordinary skill in the art to use a marked splint in Hajnal et al. to immobilize the patient to reduce motion artifacts and provide means for determining the position of the splint as taught by Sepponen.

Allowable Subject Matter

Claims 93,94,96,99-102,116, and 117 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claims 106 and 111 would be allowable if rewritten to overcome the rejection under 35 U.S.C. § 112 and to include all of the limitations of the base claim and any intervening claims.

Claims 120-138 and 150-161 are allowable over the prior art of record.

Response to Amendment

In view of applicant's arguments, the rejections of claims 94,106,111,116,117,120-131,133-138, and 150-161 have been withdrawn.

In response to Applicant's argument that there is no suggestion to combine the references, the Examiner recognizes that references cannot be arbitrarily combined and that there must be some reason why one skilled in the art would be motivated to make the proposed combination of primary and secondary references. In re Nomiya, 184 USPQ 607 (CCPA 1975). However, there is no requirement that a motivation to make the modification be expressly articulated. The test for combining references is what the combination of disclosures taken as a whole would suggest to one of ordinary skill in the art. In re McLaughlin, 170 USPQ 209 (CCPA 1971). references are evaluated by what they suggest to one versed in the art, rather than by their specific disclosures. In re Bozek, 163 USPQ 545 (CCPA) 1969. In this case, Hajnal et al. teaches a method of MR imaging of anisotropically restricted diffusion of water in the nervous system and suggests that anisotropic features can be demonstrated within the cranial and peripheral nerves. Note page 2, second column,page 14,col. 1, last paragraph, and fig. 20 in which the sciatic nerve is shown. Applicant has agreed that Hajnal et al. can distinguish neural tissue in the brain at a conspicuity that is at least 1.1 times that of non-neural tissue. Hajnal et al. further teaches highlighting particular nerve tracts that are in a particular direction to the gradients being applied and further suggests that the correct positioning and plane of the image is important.

Suzuki et al teaches a method and system for highlighting certain tissue and suppressing fat tissue to enhance the image. Gordon teaches the use of a contrast agent when imaging the spine.

It is the opinion of the examiner that the use of contrast agents in imaging is well known in the art and to use such an agent to image any part of the body is a matter of design choice.

It is the examiner's opinion that the applicant's interpretation of the remaining rejected claims is broader than the actual claim language allows.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Brian Casler whose telephone number is (703) 308-3552.

LEE S. COHEN
PRIMARY EXAMINER
ART UNIT 335

BLC/blc
February 5, 1995